

Name: \_\_\_\_\_

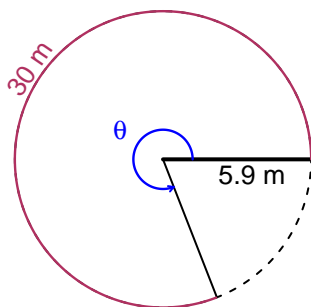
Date: \_\_\_\_\_

## Trig Final (SLTN v624)

- You can use a calculator (like [Desmos](#))
- You should have a unit-circle with special angles and coordinates marked.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 5.9 meters. The arc length is 30 meters. What is the angle measure in radians?

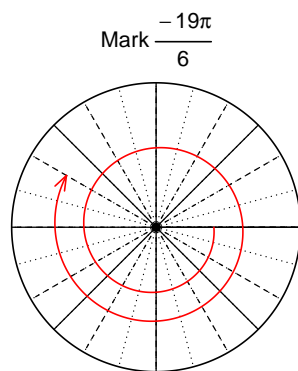


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$$\theta = 5.085 \text{ radians.}$$

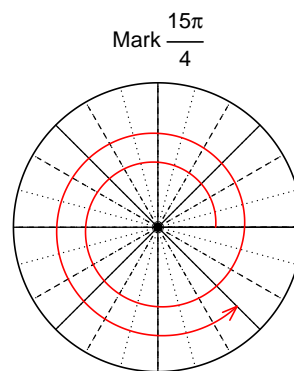
### Question 2

Consider angles  $-\frac{19\pi}{6}$  and  $\frac{15\pi}{4}$ . For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for  $\sin\left(-\frac{19\pi}{6}\right)$  and  $\cos\left(\frac{15\pi}{4}\right)$  by using a unit circle (provided separately).



Find  $\sin(-19\pi/6)$

$$\sin(-19\pi/6) = \frac{1}{2}$$



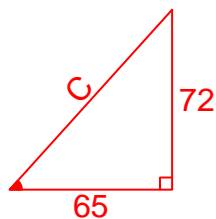
Find  $\cos(15\pi/4)$

$$\cos(15\pi/4) = \frac{\sqrt{2}}{2}$$

### Question 3

If  $\tan(\theta) = \frac{-72}{65}$ , and  $\theta$  is in quadrant II, determine an exact value for  $\sin(\theta)$ .

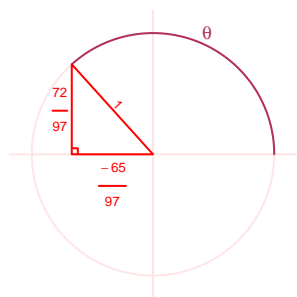
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}65^2 + 72^2 &= C^2 \\ C &= \sqrt{65^2 + 72^2} \\ C &= 97\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{72}{97}$$

### Question 4

A mass-spring system oscillates vertically with a midline at  $y = -3.3$  meters, an amplitude of 4.87 meters, and a frequency of 8.26 Hz. At  $t = 0$ , the mass is at the maximum height. Write an equation to model the height ( $y$  in meters) as a function of time ( $t$  in seconds).

Any of these equations would get full credit.

$$y = 4.87 \cos(2\pi 8.26t) - 3.3$$

or

$$y = 4.87 \cos(16.52\pi t) - 3.3$$

or

$$y = 4.87 \cos(51.9t) - 3.3$$